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09/724,616	11/28/2000	Michael L. Ziegler	10001161-1	8427

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EXAMINER

NAHAR, QAMRUN

ART UNIT PAPER NUMBER

2124

DATE MAILED: 07/07/2003

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Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/724,616

Applicant(s)

ZIEGLER ET AL.

Examiner

Qamrun Nahar

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 28 November 2000.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-11 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-11 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 November 2000 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_ 6) ☐ Other: \_\_\_\_\_

### DETAILED ACTION

1. Claims 1-11 have been examined.

#### *Claim Rejections - 35 USC § 112*

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claim 10 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The preamble of claim 10 recites "A computer-implemented method for software error recovery". However, claim 10 recites "means" language in a method claim, which is improper because "means" language is used in system/apparatus claims. The preamble is interpreted as "An apparatus for software error recovery".

#### *Claim Rejections - 35 USC § 102*

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 1 and 9 are rejected under 35 U.S.C. 102(e) as being anticipated by Tsai (U.S. 6,161,196).

**Per Claim 1:**

The Tsai patent discloses:

- **a computer-implemented method for software error recovery** (“The invention provides a general error detection and recovery technique that ensures data integrity for critical data without the need for any modification of source code or executable code, while also providing a high degree of automation and transparency for fault-tolerant configuration and operation.” in column 2, lines 32-37)
- **compiling program source code into a first set of object code with a first compiler; compiling the program source code into a second set of object code with a second compiler** (“Error detection in the FIG. 7 embodiment is accomplished via replication of a given target program on three different machines, with each copy of the target program controlled by one of the separate backends 28-i on one of the three machines. These backends communicate with the single frontend 100, which serves as a coordinator for the backends 28-i and is operative to determine discrepancies among the different copies of the target program as the copies execute.” in column 8, lines 19-29, each backend inherently compiles the program source code into respective object code)
- **identifying checkpoints in the first and second sets of object code, each checkpoint in the first set of object code corresponding to a checkpoint in the second set of object code;**

**associating sets of data objects with the checkpoints; automatically generating executable checkpoint code for execution at the checkpoints, the checkpoint code configured to store state information of the associated data objects for recovery if execution of the program is interrupted** (“In operation, each of the copies of the target program may be temporarily stopped at the beginning of the first program instruction. At that point, the user selects the desired voting parameters, e.g. variables to be voted upon and voting times, and recovery parameters, using a creation GUI of the frontend 100. ... only a subset of these or other similar parameters are specified by the user. The frontend 100 then sends the corresponding commands to each of the backends 28-i. The frontend creation GUI described above may be modified in a straightforward manner to allow this user specification of the voting parameters and recovery parameters. When the appropriate breakpoints have been inserted by the backends 28-i, the execution of all copies of the target program is resumed. For each breakpoint, each backend 28-i will report the value of preselected critical variables to the frontend 100. If the frontend 100 finds that all reported values are identical, then it instructs each backend 28-i to continue execution of its copy of the target program.” in column 8, lines 30-48)

**- executing the first set of object code; storing the state information in executing the checkpoint code; and upon detecting an error in execution of the first set of object code, resuming execution of the program using the second set of object code** (“FIG. 8 illustrates a situation in which the frontend 100 detects a divergence in the reported values from the backends 28-i. The backend with the minority value is identified as the erroneous backend, and execution of the target program is terminated on the corresponding machine. The erroneous backend in

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this example is backend2 (28-2). A checkpoint is then taken from one of the non-erroneous backends, e.g., backend 1 (28-1), and that checkpoint data is copied to the machine with the erroneous backend, i.e., backend2 (28-2), and a new target program is initiated on backend2 using the checkpoint data.” in column 8, lines 49-61).

**Per Claim 9:**

This is an apparatus version of the claimed method discussed above, claim 1, wherein all claim limitations also have been addressed and/or covered in cited areas as set forth above.

Thus, accordingly, this claim is also anticipated by Tsai.

***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 2-8 and 10-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsai (U.S. 6,161,196) in view of Fuchs (U.S. 5,590,277).

**Per Claim 2:**

The rejection of claim 1 is incorporated, and further, Tsai does not explicitly teach upon detecting an error in execution of the first set of object code, initially re-executing the first set of object code; and resuming execution using the second set of object code if the first set of object

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code fails in re-execution. Fuchs teaches upon detecting an error in execution of the first set of object code, initially re-executing the first set of object code; and resuming execution using the second set of object code if the first set of object code fails in re-execution (column 15, lines 48-67 to column 16, lines 1-10 and column 17, lines 26-31).

It would have been obvious to one having ordinary skill in the computer art at the time of the invention was made to modify the method disclosed by Tsai to include upon detecting an error in execution of the first set of object code, initially re-executing the first set of object code; and resuming execution using the second set of object code if the first set of object code fails in re-execution using the teaching of Fuchs. The modification would be obvious because one of ordinary skill in the art would be motivated to debug the faulty program.

**Per Claim 3:**

The rejection of claim 2 is incorporated, and Fuchs further teaches re-executing the first set of object code a selected number of times before resuming execution using the second set of object code (column 17, lines 26-31).

**Per Claim 4:**

The rejection of claim 3 is incorporated, and Fuchs further teaches ceasing resumption of execution of the first and second sets of object code if an error is detected in executing both sets of object code (column 17, lines 31-37).

**Per Claim 5:**

Tsai teaches a computer-implemented method for software error recovery (“The invention provides a general error detection and recovery technique that ensures data integrity for critical data without the need for any modification of source code or executable code, while also providing a high degree of automation and transparency for fault-tolerant configuration and operation.” in column 2, lines 32-37); compiling program source code into a first set of object code with a first compiler; compiling the program source code into a second set of object code with a second compiler (“Error detection in the FIG. 7 embodiment is accomplished via replication of a given target program on three different machines, with each copy of the target program controlled by one of the separate backends 28-i on one of the three machines. These backends communicate with the single frontend 100, which serves as a coordinator for the backends 28-i and is operative to determine discrepancies among the different copies of the target program as the copies execute.” in column 8, lines 19-29, each backend inherently compiles the program source code into respective object code); identifying checkpoints in the first and second sets of object code, each checkpoint in the first set of object code corresponding to a checkpoint in the second set of object code; associating sets of data objects with the checkpoints; automatically generating executable checkpoint code for execution at the checkpoints, the checkpoint code configured to store state information of the associated data objects for recovery if execution of the program is interrupted (“In operation, each of the copies of the target program may be temporarily stopped at the beginning of the first program instruction. At that point, the user selects the desired voting parameters, e.g. variables to be voted upon and voting times, and recovery parameters, using a creation GUI of the frontend 100. ... only a subset of these or other similar parameters are specified by the user. The frontend 100



then sends the corresponding commands to each of the backends 28-i. The frontend creation GUI described above may be modified in a straightforward manner to allow this user specification of the voting parameters and recovery parameters. When the appropriate breakpoints have been inserted by the backends 28-i, the execution of all copies of the target program is resumed. For each breakpoint, each backend 28-i will report the value of preselected critical variables to the frontend 100. If the frontend 100 finds that all reported values are identical, then it instructs each backend 28-i to continue execution of its copy of the target program.” in column 8, lines 30-48); executing the first set of object code; storing the state information in executing the checkpoint code; and upon detecting an error in execution of the first set of object code, selecting the second set of object code in resuming execution of the program (“FIG. 8 illustrates a situation in which the frontend 100 detects a divergence in the reported values from the backends 28-i. The backend with the minority value is identified as the erroneous backend, and execution of the target program is terminated on the corresponding machine. The erroneous backend in this example is backend2 (28-2). A checkpoint is then taken from one of the non-erroneous backends, e.g., backend 1 (28-1), and that checkpoint data is copied to the machine with the erroneous backend, i.e., backend2 (28-2), and a new target program is initiated on backend2 using the checkpoint data.” in column 8, lines 49-61). Tsai does not explicitly teach selecting the first set of object code in resuming execution of the program. Fuchs teaches selecting the first set of object code in resuming execution of the program (column 15, lines 48-67 to column 16, lines 1-10).

It would have been obvious to one having ordinary skill in the computer art at the time of the invention was made to modify the method disclosed by Tsai to include selecting the first set

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of object code in resuming execution of the program using the teaching of Fuchs. The modification would be obvious because one of ordinary skill in the art would be motivated to debug the faulty program.

**Per Claims 6-8:**

These are another versions of the claimed method discussed above (claims 2-4, respectively), wherein all claim limitations also have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, these claims are also obvious.

**Per Claim 10:**

This is an apparatus version of the claimed method discussed above, claim 5, wherein all claim limitations also have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, this claim is also obvious.

**Per Claim 11:**

This is a computer program product version of the claimed method discussed above, claim 5, wherein all claim limitations also have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, this claim is also obvious.

***Conclusion***

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

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9. Any inquiry concerning this communication from the examiner should be directed to Qamrun Nahar whose telephone number is (703) 305-7699. The examiner can normally be reached on Mondays through Thursdays from 9:00 AM to 6:30 PM. The examiner can also be reached on alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kakali Chaki, can be reached on (703) 305-9662. The fax phone number for the organization where this application or processing is assigned is (703) 746-7239.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-3900.

QN  
June 19, 2003

*Kakali Chaki*  
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